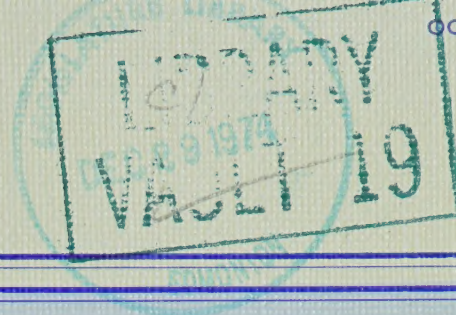


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REPORT AND DECISION ON  
REVIEW OF POLICIES AND PROCEDURES  
FOR CONSIDERING APPLICATIONS UNDER  
THE GAS RESOURCES PRESERVATION ACT, 1956

OCTOBER 1969

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*Oil* OIL AND GAS CONSERVATION BOARD

603 SIXTH AVENUE SOUTH WEST • CALGARY 1, ALBERTA





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OCTOBER 1969

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## I INTRODUCTION

This report deals with an application by the Alberta Division of the Canadian Petroleum Association (hereinafter called "CPA") requesting that the Oil and Gas Conservation Board modify its present policies and procedures in determining the volume of gas reserves surplus to the needs of the Province. Prior to a detailed analysis of the policy matters considered at the hearing of the application, a review of the statute provisions, the current method of determining the surplus and the events leading up to the application is appropriate.

### Background

The Board is charged with the responsibility under The Gas Resources Preservation Act, 1956, of ensuring the effective utilization of the oil and gas resources of the Province having regard to the present and future needs of persons within the Province. The Act directs the Board to inquire into applications made by qualified persons, for permits authorizing the removal of gas from the Province. Following inquiry the Board, with the approval of the Lieutenant Governor in Council, may grant a permit, refuse to grant a permit or defer consideration.

Section 8, subsection (3) of The Gas Resources Preservation Act, 1956, states:

"(3) The Board shall not grant a permit for the removal of any gas or propane from the Province unless in its opinion it is in the public interest to do so having regard to

(a) the present and future needs of persons within the Province, and



- (b) the established reserves and the trends in growth and discovery of reserves of gas or propane in the Province."

It is under this provision of the Act that the Board prior to ruling on applications for permits authorizing the removal of gas from the Province,

- (a) estimates the established reserves of gas in the Province,
- (b) analyses and projects the trends in the growth of reserves of gas in the Province,
- (c) estimates the gas requirements of the Province for a 30-year period,
- (d) calculates the gas necessary to meet the annual and peak day requirements of the Province for a 30-year period and to meet existing permit commitments, and
- (e) analyses the surplus position of the Province for gas having regard to the established reserves, the growth in reserves, the 30-year requirements and the existing permit commitments.

The Board in assessing the surplus position of the Province with respect to gas has since 1966 categorized the requirements and reserves into contractable and remaining. Briefly, contractable requirements are the total of the Alberta requirements which would normally be under contract to a utility company or large industry and the existing permit commitments. Remaining requirements include those for delivery to meet



local needs in the latter portion of the 30-year period plus the gas necessary to sustain peak deliveries in the terminal or 30th year. Contractable reserves are those available for delivery now or in the near future which are under contract or which could be contracted for. Remaining and future reserves include both those currently beyond economic reach and those where production has been deferred but where production can be expected within 30 years. Also included in remaining and future reserves are certain gas reserves not yet discovered or developed but which the Board anticipates will be developed within an early period.

In the actual consideration of an application for a permit authorizing the removal of gas from the Province, the Board assesses the availability of a surplus in the following manner:

1. It determines the existence or otherwise of a contractable surplus by comparing
  - (a) the contractable reserves, being the established reserves within economic reach less any reserves deferred for reasons of cycling or oil conservation, and
  - (b) the total of the contractable Alberta requirements and the remaining permit commitments, where the contractable Alberta requirements are taken as the greater of 30 times the requirements of the first year of the period under consideration or the remaining reserves in those fields committed to and supplying Alberta's requirements.

2. The Board determines the existence or otherwise of a future surplus by comparing

- (a) the remaining Alberta requirements including the gas necessary to provide for the terminal year peak day, and
- (b) the remaining and future reserves determined as the portion of the reserves now beyond economic reach which the Board estimates will be within economic reach within the 30-year period, the portion of the deferred reserves which the Board estimates will become available within the 30-year period, and the growth of gas reserves anticipated over a 24-month period commencing at the time of the appraisal.

3. Where the application is otherwise satisfied, and where there is a contractable surplus adequate to meet part or all of the requirements of an application for the removal of gas from the Province, and where there is also a future surplus, the Board is prepared to grant a permit for the removal of gas from the Province.

4. Where the application is otherwise satisfied, and where there is a contractable surplus adequate to meet part or all of the requirements of an application for the removal of gas from the Province, but where there is a future deficit, the policy of the Board is to have regard for the fact that the terminal year peak day requirement portion of the remaining Alberta requirements is somewhat uncertain. In such an instance, the Board



considers the significance of any such deficiency in this portion of the requirements having regard for the long term growth rate of gas reserves, the percentage of the apparent ultimate reserves of the Province that have already been developed, the likelihood that the peak day requirements could be supplied by other means, and the number of additional years of growth of gas reserves which would be required to overcome the deficiency. If the Board is satisfied that the future deficit could be met by a reasonable additional number of years of growth of gas reserves, it is prepared to grant a permit for the removal of gas from the Province.

As is noted in paragraph numbered 2 above, the Board has regard to the trends in growth and discovery of reserves of gas in the Province by including in the reserves available to meet the remaining requirements of the Province, the growth in reserves that could reasonably be expected over a two-year period. This has been its practice for approximately the past 10 years. Since 1966, the Board policy, under the conditions described in paragraph numbered 4 above, has been to rely upon more than two years growth of gas reserves for the protection of the 30th year peak day requirement.

The Board has over the years received a number of requests to increase its reliance on future gas by using up to five years growth of reserves. Following the last representation in 1968, from CPA, the Board stated that it would be prepared to reconsider this matter at a special hearing if CPA or any

other interested party wished to make an application.

Application of the Alberta Division of the Canadian  
Petroleum Association

CPA in a submission dated April, 1969, requested that the Board convene a special hearing to receive representations from interested persons regarding the Board's present policies and procedures in determining what volumes of reserves are surplus to the future needs of persons within the Province pursuant to section 8 of The Gas Resources Preservation Act, 1956. The CPA application specifically sought to have the Board's policy so changed that the average annual growth rate for gas reserves as used in determining the future surplus be calculated on the basis of the average over the most recent 10-year period and that the number of years of growth in reserves be determined on the basis of the Province's estimated remaining reserve potential. (These matters are more fully dealt with in Sections II and III of this report.) CPA also applied to have a portion of currently deferred gas included in the calculation of the contractable surplus rather than in the future surplus as is now the practice. (This matter is discussed in Section IV.)

CPA included in its submission a study of the total potential reserves of oil, gas, natural gas liquids and associated sulphur in Canada. The term potential reserves as used in the application referred to estimates of the total amounts of these products that can be expected to be ultimately recovered under present day technology and conventional methods of production.



The Geological Reserves Committee of The Canadian Petroleum Association used the volumetric method in estimating the potential reserves in Canada. It estimated the volume of sedimentary rocks in a given area and multiplied this volume by an oil recovery factor which was an estimate of the number of barrels of recoverable oil believed to exist per volumetric unit of sediment. Having determined the potential oil reserves by the volumetric method, the Committee determined the potential gas reserves using a gas reserve to oil reserve ratio. Both the oil recovery factor and the gas to oil ratio were estimated on the basis of experience in areas considered to be comparable and in advanced stages of development.

The Committee study concluded that the potential reserves of Alberta were 150 trillion cubic feet of raw natural gas and that 120 trillion cubic feet of this raw gas would be marketable.

CPA also included in its submission an approximate assessment of the cost to the producer within the Province of delay in initial sales of gas reserves. The submission concluded that the average before tax cost to the gas producing industry of carrying an unsold developed inventory of one trillion cubic feet of gas for one year would be approximately 3.3 million dollars. The applicant stated that if Board or other Government regulation caused a delay in marketing, this would be an unnecessary loss to the gas producing industry and to the provincial economy generally.

### The Hearing

Upon receipt of the application from CPA the Board further reviewed the policies respecting applications made under The Gas Resources Preservation Act, 1956, and decided to provide for representations respecting other matters affecting its present procedures. Accordingly, the Board issued a Notice of Hearing dated April 30, 1969, enunciating the specific proposals of CPA that the policies be altered by:

- (a) calculating the average annual growth rate for additions to gas reserves on the basis of the average growth rate over the most recent 10-year period,
- (b) determining the number of years of future gas to be used in the surplus calculation on the basis of the Province's estimated remaining reserve potential,
- (c) including a portion of currently deferred gas in the calculation of the contractable surplus.

The Notice of Hearing also provided for the consideration of submissions respecting the following matters:

- (d) the holding of an annual hearing to consider the gas reserves of the Province and the use of these reserves to assess applications made during the subsequent year,
- (e) the holding of a hearing annually, or at some other regular interval, to consider the requirements of



the Province for gas and the use of these requirements to assess applications made during the interim prior to the next regular hearing,

- (f) the simplification of interim calculations of the gas necessary to meet the Province's total requirements by expressing, on the basis of history, the total requirements or peak requirements or both of the Province as a multiple of the first year's requirements.

(The matters referred to in clauses (d), (e) and (f) above are discussed in Sections V and VI.)

The application of CPA and the representations respecting the other matters were heard on June 18 to 20, 1969, by the Oil and Gas Conservation Board, with G. W. Govier, P. Eng., A. F. Manyluk, P. Eng., and Vernon Millard sitting.

#### APPEARANCES

The following persons appeared at the hearing:

<u>Appearances</u>	<u>Abbreviation of Name Used in Report</u>	<u>Represented by</u>	<u>Witnesses</u>
Alberta Division of the Canadian Petroleum Association	CPA	D.W. MacFarlane	C.R. Mattinson J.B. McDonald, P. Eng. R.L. Slavin, P. Geol.
Alberta and Southern Gas Co. Ltd.	Alberta and Southern	R.A. MacKimmie, Q.C.	D. McMorland, P. Geol.
Canadian Fina Oil Limited	Canadian Fina	G. W. Brown	R. Pot, P. Eng.

<u>Appearances</u>	<u>Abbreviation of Name Used in Report</u>	<u>Represented by</u>	<u>Witnesses</u>
Canadian Western Natural Gas Company Limited and Northwestern Utilities, Limited	Utility Companies	G.A.C.Steer,Q.C.	J. E. Maybin, P.Eng.
City of Calgary and City of Edmonton	Cities	S.J.Helman, Q.C. A.F.Macdonald, Q.C.	D. L. Flock, P.Eng.
Consolidated Natural Gas Limited	Consolidated	J. H. Laycraft, Q.C.	N. J. Lashuk, P.Eng.
Great Plains Development Company of Canada, Ltd.	Great Plains	P. Podmaroff, P.Eng.	P. Podmaroff,P.Eng.
Home Oil Company Limited	Home	J. R. Sears, P.Eng.	J. R. Sears, P.Eng.
Husky Oil Ltd.	Husky	G.G.Meisner, P.Eng.	G. G. Meisner, P.Eng.
Pacific Petroleums Ltd.	Pacific	G. W. Lade	A. D. Rogan, P.Eng.
Pan American Petroleum Corporation (now named Amoco Canada Petroleum Company Ltd.)	Amoco	G. E. Little	G. M. Chernoff,P.Eng.
Shell Canada Limited	Shell	C.R.Fetherston	C. R. Mattinson
Trans-Canada Pipe Lines Limited	Trans-Canada	R.J.Ludgate	G.A.Leslie,P.Geol.
Westcoast Transmission Company Limited	Westcoast	J. Lutes	
Board Staff		G.J.DeSorcy,P.Eng. G.C. Watkins	



Westcoast at the hearing, confined itself to cross-examination of witnesses.

## II THE CALCULATION OF THE AVERAGE ANNUAL GROWTH RATE FOR USE IN THE SURPLUS CALCULATION

---

As discussed in Section I, in its determination of the existence or otherwise of a future surplus the Board includes in the estimated remaining and future reserves the growth of gas reserves anticipated over a two-year period. It is the Board's current policy to set the growth rate for this period as the lesser of the long term post - 1950 growth rate or the rate established during the immediately preceding 24-month period.

### (1) Views of CPA

CPA proposed that the average annual trend of additions to gas reserves be determined as the average of the most recent 10-year period. In support of this proposal, the CPA submission stated that the use of a 10-year average would relate the trend of reserve additions to a current period, would minimize the effect of short term fluctuations in discovery rate and would eliminate the effect of the early history of exploration successes. It was submitted by CPA to be the fairest method of reflecting the performance potential of the industry over the long term.

In answer to questions put to him at the hearing by Mr. Steer, Mr. McDonald said that the present Board policy of using the lesser of the long term or two-year growth rate is an overly protective and unrealistic way of assessing the future potential of the industry in Alberta. He said that there were adequate safeguards in the CPA proposals without the inclusion of the

two-year feature. He said that if there were a rapid falling off of the reserves growth curve this would be reflected in the magnitude of the reserves available in the surplus calculations. Mr. McDonald predicted that a permanent falling off of the curve should not occur until about 75 per cent of the ultimate reserves of the Province have been discovered. From that point onward, he said, there would be a gradual declining trend which would be adequately approximated by the extrapolation of reserves growth on the moving 10-year basis proposed by CPA.

He later gave an indication of the sensitivity of the approximation by using the CPA forecast curve to demonstrate the degree of departure between actual and preceding 10-year growth trends. For 1990, the year of poorest agreement, the annual growth was predicted by CPA to be 1.8 trillion cubic feet, while the average annual growth rate in the 10 years 1981 to 1990, as determined from the same curve, was estimated to be 2.3 trillion cubic feet, giving a difference of 0.5 trillion cubic feet of 1000 British thermal unit gas. Mr. McDonald said that only about 0.6 years of trend gas would be used in surplus calculations in 1990 (in accordance with the CPA proposed formula and the CPA estimate of reserves remaining to be discovered), implying that this factor would tend to offset the trend curve discrepancy and result in adequate protection for Albertans. The CPA formula for years of trend gas is discussed in Section III. The time lag between the actual growth curve and the extrapolation of the 10-year trend



in the period of declining growth rate was estimated by Mr. McDonald to be about four years.

In response to questioning by the solicitors for the Cities, Mr. McDonald agreed that there was never, to his knowledge, an actual case of contractable reserves of gas having been locked in due to the two-year trend feature of the Board's current policy. He said that such locking in could occur in the next 10 years due to the cyclic nature of reserves growth, and if it should occur, might tend to cause gas purchasers in distant markets to lose confidence in the Alberta supply. The matter of locking in of gas is discussed further in Section III.

Mr. McDonald said that CPA had checked the sensitivity of the 10-year average growth trend against that for other periods and had found that a period of 7 to 10 years is best for smoothing highs and lows and for representing the industry progress record. A period of less than seven years would cause unsatisfactory swings in the growth trend, he said.

In closing argument, Mr. MacFarlane said that if the Board were concerned that the 10-year averaging period was too lengthy, he believed that CPA would not object to the use of a six- or seven-year period instead.

## (2) Views of the Utility Companies

The Utility Companies agreed that it would be reasonable to adopt the proposed 10-year trend period in place of the long term trend now in use. They stated that recent experience in the growth rate must be given some weight, and recommended that the

growth rate used to determine the amount of trend gas used in the surplus calculation be the average of the most recent 10-year or three-year period, whichever is the lesser. Mr. Maybin testified that if a three-year period were used instead of the current two-year period this would eliminate the locking in of gas due to one atypical year of very small reserves growth. He said that the short term swings are not too meaningful at this stage of reserves development but would become most meaningful when most of the reserves have been discovered. At that time, he said, a trend setting method of greater sensitivity than the proposed 10-year average should be used. While advocating that the Board maintain some flexibility in interpreting the reasons for a sharp down-turn in growth and act accordingly, Mr. Maybin agreed that industry must have an appreciation of the administrative ground rules as preparation is being made for gas permit hearings.

### (3) Views of the Cities

Like the Utility Companies, the Cities recommended the use of the lesser of a 10-year average growth rate or the rate for a shorter period, say three years, in the surplus calculation. In representing the Cities at the hearing, Dr. Flock said that use of the three-year average could be considered as a safety factor which would provide a suitable control at the time when a permanent decrease in discovery rate occurred. He agreed that the same type of control might be achieved if the 10-year averaging period were reduced in relation to the ultimate remaining reserves.

(4) Views of Other Interveners

Alberta and Southern, Amoco, Canadian Fina, Consolidated, Great Plains, Home, Husky, Pacific, Shell and Trans-Canada supported the CPA proposal to establish the trend in reserves growth by averaging the growth rate over the most recent 10-year period.

Mr. McMorland, the witness for Alberta and Southern, said that due to the past history of the growth trend in Alberta it is not necessary to consider shorter averaging periods such as two or three years. In argument, Mr. McKimmie said that a 10-year average trend would be more realistic than a trend established by the current method.

Amoco observed that any locking in of gas resulting from the Board's present policies in determination of surplus would have a profound effect on the company's gas exploration and production effort and would require a re-assessment of further activities. Mr. Chernoff, testifying for Amoco, said that it would be appropriate to set the trend in reserves growth rate at annual reserves hearings if the Board decided to hold such hearings.

Husky stated that the CPA proposal would tend to dampen and moderate the effect of large swings in the rate of discovery of gas.

Pacific said that the 10-year average is long enough to moderate cyclical swings in reserve discoveries and short enough to be more representative of the current trend of reserves growth



than the long term trend rate.

(5) Views of the Board

The Board agrees with the more or less unanimous opinion presented at the hearing affirming the suitability of basing the projected future growth rate for gas reserves on the most recent 10-year period instead of the long term post-1950 period.

The Board has given serious consideration to the evidence presented at the hearing respecting the desirability or otherwise of modifying the 10-year period appraisal through application of a short term test in the event that the growth rate in the most recent two to six years is below that experienced earlier in the period. The Board concludes that such a short term test should not be applied in every instance as a matter of policy in that temporary reductions in the reserves growth rate can occur for many reasons which would not necessarily mean that the growth rate should continue to decline. On the other hand, the Board wishes to retain sufficient flexibility so that it may, where appropriate, give greater weight to the latter portion of the 10-year period. For this reason the Board believes the reserve growth applicable for a number of years in the immediate future should be forecast on the basis of a best judgment projection of the growth experienced in the preceding 10 years. The duration into the future of this projection is discussed in detail in the following section.

Considering the approximate fraction of ultimate reserves developed to date, a straight line projection at essentially the arithmetic average growth rate experienced over the previous

ten years could be expected. In any event, the growth rate projected for the future would not exceed the average rate over the previous 10 years. However, in some instances where several years of less than average reserves growth has been experienced at the end of the 10-year period, the Board may project a declining growth rate into the future. Factors which might affect the Board's judgment as to whether a continued declining growth rate should be anticipated will include the fraction of ultimate reserves considered to be developed, the demand for gas during the latter portion of the period being investigated and estimated for the immediate future, the level of exploration activity and the related success ratio, the trends in oil exploration, the general state of the economy, and pertinent political or regulatory developments in the marketing region.

### III THE NUMBER OF YEARS OF GROWTH OF GAS RESERVES

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In gas permit applications considered since 1959, the Board has used a two-year reserve growth allowance in its calculations of the Alberta gas surplus. The Board defined the two-year allowance as being the lesser of the long term growth rate as computed by the Board or the actual reserve growth in the most recent 24-month period.

The Board modified this policy in its report of June, 1966<sup>(1)</sup> in so far as it pertained to reserves necessary to provide deliverability in meeting 30th-year peak requirements. It recognized that such requirements differed from other requirements in that a substantial portion of the cushion gas requirements may be satisfied by alternative methods. However, in considering the portion of cushion gas that may be met from the growth in reserves beyond the two-year period, the Board did not believe it desirable to adopt a fixed quantity or set number of additional years growth in gas reserves. Rather, the Board indicated "it would have regard to the long term growth rate of gas reserves, the number of years of growth at this rate that would be required to satisfy the portion of the requirement not otherwise met, the percentage of the apparent ultimate reserves of the Province that have already been developed, the likelihood that the peak day requirements would to some extent be supplied by

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(1) Report on an Application of Trans-Canada Pipe Lines Limited under The Gas Resources Preservation Act, 1956. June, 1966.



other means, and any other matters of relevance." The Board has reaffirmed this policy in subsequent reports.

In summary, the Board's current policy is to include two years growth of gas reserves in the future surplus calculation. In the event that the remaining Alberta requirements exceed the remaining and future reserves, the Board has regard for the fact that the cushion gas portion of the remaining Alberta requirements is a less definite requirement for gas and considers the significance of any deficiency in the meeting of this portion of the requirement in the light of the factors set forth above and the number of additional years of growth of gas reserves which would be required to overcome the deficiency.

(1) Views of CPA

CPA proposed that the number of years of growth of gas reserves allowed in surplus calculations be determined by the following formula:

$$\text{Years of Growth} = \frac{\text{Potential Reserves} - \text{Ultimate Reserves}}{10}$$

where Potential Reserves = ultimate recoverable marketable natural gas reserves of Alberta including both existing pools and future discoveries;

Ultimate Reserves = ultimate recoverable marketable natural gas reserves discovered in Alberta at the date of calculation.

CPA contended the formula provided a simple method of relating the number of years of gas reserve growth used in future surplus calculations to the degree of development of Alberta's gas reserves. Based on a potential gas reserve figure of 100 trillion cubic feet,

CPA estimated that at the present time, the formula would yield some 4.9 years of growth of gas reserves for inclusion in the future surplus calculation. This figure corresponded to a degree of reserve development of some 50 per cent. When 75 per cent of the assumed 100 trillion cubic feet of reserves had been discovered, the formula would generate 2.5 years of gas reserve growth; at 90 per cent development only 1 year would be used.

CPA believed that, in conjunction with its proposal for calculating the average annual trend in additions to reserves, the formula would provide an adequate safeguard for Alberta's gas consumers. Under cross-examination at the hearing, Mr. McDonald, a witness for CPA, indicated that the denominator of 10 incorporated in the formula was designed to yield approximately 5 years of growth in gas reserves at the current stage of development of the Province's potential reserves. This was consistent with previous recommendations made by CPA to the Board. Mr. McDonald also revealed it was not CPA's intention that the formula would be used in a rigid manner; rather, it would function more as a guideline for the Board.

## (2) Views of the Cities

The Cities stated that the use of two years growth in gas reserves under the current Board policy had not resulted in problems in the past and would not in the future, if the discovery rate remained at high levels. The Cities suggested that any increased reliance on future gas reserves by the Board should be temporary, until a subsequent reserves and requirements

hearing be held. In testimony, Dr. Flock witness for the Cities, clarified the Cities' position. He stated that the Cities were not strongly opposed to the use of some additional years of gas reserve growth and that the allowance might extend to three years. This view was related to the Cities' position that up to 50 per cent of the Province's future requirements could be protected by future gas reserves. However, they considered the incorporation of as much as five years growth in gas reserves in the surplus calculation would not be satisfactory. The Cities added that knowledge of the long term requirements and the reserves of the Province were essential to provide an adequate forecast of the future supply of gas and that consequently any addition to the number of years of gas reserve growth should be confirmed by future reserve and requirement hearings.

### (3) Views of the Utility Companies

The Utility Companies endorsed CPA's approach in so far as it introduced potential reserves as a consideration, but were not convinced that the danger of contractable reserves becoming 'locked in' to cover a future gas shortage was significant. The Utility Companies remained in favour of the Board's present policy of considering the future deficiency in relation to growth in the number of years of gas reserves required for its satisfaction. Fundamentally, the Utility Companies submitted that a review of the use of future gas reserves from time to time was preferable to the adoption of a formula. However, they did not oppose adoption of three years of gas reserve growth at the



present stage of development of the Province's reserve potential and stated that such an adjustment would reduce the possibility of an unnecessary 'locking in' of contractable reserves.

At the hearing, Mr. Maybin, witness for the Utility Companies, elaborated upon their submission. Mr. Maybin stated that calculations undertaken by the Utility Companies did indicate that the Board's current reserve growth allowance could result in the computation of a future deficiency as a consequence of one year of poor reserve additions. Thus, the Utility Companies said the present formula was somewhat too sensitive to one bad year and suggested this difficulty could be overcome by adopting three years of reserve growth. Mr. Maybin also explained that their support of the CPA philosophy concerned the relationship between discovered reserves and potential reserves as a determinant of the degree of reliance on future discoveries. Mr. Maybin stated that the CPA formula, if adopted, should not be rigidly applied and suggested that the use of ultimate reserve figures higher than those currently estimated by the Board would detract from the value of the formula as a test. Reliance on an excessive number of years of growth in gas reserves was inappropriate in view of the uncertainty involved.

(4) Views of Trans-Canada

Trans-Canada supported the use of the Province's estimated reserve potential in determining the number of years of gas reserve growth. At the hearing, Mr. Leslie, witness for Trans-Canada, recognized that the estimation of potential reserves was not a precise exercise but said it would be unfortunate if

the Board were to discard the formula approach for this reason. He stated an assessment could be based on ranges, with the Board accepting a lower range figure to reflect caution.

(5) Views of Alberta and Southern

Alberta and Southern generally supported the proposal of CPA but was concerned that the use of a formula would introduce rigidity, thereby inhibiting the Board in the exercise of its judgment.

(6) Views of Home

Home expressed a belief the Board's present policy of using only two years of gas reserve growth was unreasonable. Accordingly, Home basically supported the CPA position, but suggested that the latter might be conservative.

(7) Views of Husky

Husky stated that the proposed CPA method would supply needed direction towards increasing the reserve discovery rate.

(8) Views of Pacific

Pacific concurred with the suggested formula of CPA and argued that it provided a simple method of relating the number of years of gas reserve growth to the degree of development of the Province's potential reserves. In addition, Pacific contended the formula provided adequate protection for the Province's future requirements by virtue of the decline in the number of years of growth in gas reserves as the Province's remaining reserve potential was reduced.

(9) Views of other Interveners

Consolidated, Shell and Amoco supported CPA, but offered

no specific evidence.

(10) Views of the Board

The Board agrees with CPA that, on the basis of historical experience and at the present stage in the development of the Province's reserves the use of two years growth of gas reserves in assessing normal applications is conservative. Although the Board's current policy, as outlined beforehand, provides for reliance on amounts in excess of two years reserves growth under appropriate circumstances, the Board believes it desirable to develop a more precise indication of the degree to which reliance on future gas reserves would be placed in appraising applications.

The Board acknowledges that the use of potential reserves as a measure of future prospects is open to the objection that such estimates are subject to considerable uncertainty. Nevertheless, the Board does believe that assessments of potential reserves, if used with caution, do supply significant information relating to the remaining reserve potential of the Province. Thus, the Board is prepared to accept the use of potential reserves as an indication of the extent to which reliance may be placed on future gas reserves. To reflect the inherent uncertainty involved and to provide adequate protection for the Province, prudence dictates that potential reserves should be assessed on a conservative basis.

The Board considers the formula suggested by CPA provides a useful mechanism for determining an appropriate number of



years of reliance on future gas reserves. It has the desirable characteristic of reducing the number of years of such reliance as the remaining potential reserves of the Province decrease. The Board believes the denominator of 10 used in the formula is reasonable at the present time and is prepared to accept it.

Thus the Board adopts the formula proposed by CPA as an element in its calculations relating to gas surplus. To recapitulate, the formula is:

$$T_G = \frac{R_{POT} - R_{EST}}{10}$$

where  $T_G$  = Years of reliance on future gas reserves;  
rounded up or down to the nearest half year,  
 $R_{POT}$  = Estimated potential, initial marketable  
reserves of the Province, trillions of  
cubic feet;  
 $R_{EST}$  = Established initial marketable reserves at  
the time of application of the formula,  
trillions of cubic feet.

The volume of future gas reserves which would be employed in the future surplus calculation would be that indicated by extending the projection of historical growth  $T_G$  years into the future.

IV     THE USE OF DEFERRED GAS RESERVES  
       IN THE SURPLUS CALCULATION

The Board in its surplus calculation currently excludes from contractable reserves those reserves where gas production is deferred beyond the normal development period of one to three years. Deferment is frequently for reasons of oil conservation, or in the case of gas reserves rich in propane and heavier hydrocarbons, is often because the reservoir is being cycled to prevent the loss of natural gas liquids. The Board does attempt to estimate the portion of these deferred reserves which it believes will be available within the 30-year protection period. These reserves are not considered as contractable but are utilized in the future surplus calculation to satisfy a portion of the remaining requirements.

(1) Views of CPA

CPA proposed that the portion of deferred gas reserves that can reasonably be expected to begin producing during the first 10 years of the 30-year protection period be included in the contractable surplus calculation as contractable reserves.

In reply to questioning at the hearing, Mr. McDonald, a witness for CPA, stated that if initial production from a deferred gas reserve will take place within 10 years the opportunity exists for the local utility companies as well as those removing gas from the Province to negotiate and contract for such gas. Accordingly, he suggested that such a reserve should be considered as contractable. He also stated

that if a deferred gas reserve is delivering or can be expected to deliver within 10 years, 25 or 50 per cent of what the deliveries would be under the normal sales contract, then the entire reserve of gas should be considered as contractable.

Mr. McDonald agreed under examination that if a deferred gas reserve from which initial deliveries will not occur for six or eight years is considered as contractable it could result in the calculation of an apparent contractable surplus even though there are not gas reserves available which could be placed under contract for immediate delivery. He also agreed that this possibility would likely be eliminated if deferred gas from which production can be expected within 10 years is considered contractable only where such gas was actually under contract.

In summary, Mr. MacFarlane stated that CPA believes that reserves from which production is deferred solely for conservation purposes are a type of reserve for which the time of initial availability can be predicted with reasonable certainty. For this reason, he argued that the CPA's submission that deferred gas available within a 10-year period should be treated as contractable is in fact a reasonable one.

## (2) Views of the Utility Companies

The Utility Companies disagreed with CPA respecting the inclusion of deferred gas in contractable reserves. The Utility Companies stated that they count on the contractable surplus aspect of the Board's present formula to assure them that gas



will be available for purchasing when additional contracts must be entered into from time to time as the needs of their systems grow. They further stated that in their view a deferred gas reserve is not contractable so long as its date of availability is uncertain and it therefore cannot be placed under contract for delivery commencing within the normal purchasing lead time.

Mr. Maybin, testifying on behalf of the Utility Companies, stated that the companies are not large enough that they can make a contract for a deferred gas reserve and agree to take such a reserve whenever it becomes available, simply because when it does become available there may not be a place for the gas. Mr. Maybin stated that the Utility Companies will have to buy more gas reserves for future customers sometime within the next 10 years. He estimated that Canadian Western Natural Gas Company Limited will have to buy reserves about five to seven years from now and that Northwestern Utilities, Limited will have to buy additional reserves within the next three years.

In summary, Mr. Maybin stated that if a reserve of deferred gas was under firm contract to a company intending to remove the gas from the Province and if the reserve was part of the reserves that the company was relying upon for its application for removal, he saw no reason why it should not be considered as contractable. He stated that if a deferred gas reserve is not under contract it should not be considered as contractable unless initial deliveries from the reserve can with a high degree of certainty

be expected within about three years.

(3) Views of the Cities

The Cities filed a joint intervention wherein they opposed the CPA suggestion that a portion of deferred gas reserves be included in the calculation of the contractable surplus. The joint submission of the Cities stated that contractable reserves should be limited to those which are under contract today, and since deferred reserves are not under contract they do not belong in the contractable surplus calculation. Dr. Flock, testifying for the Cities, stated that they would not object to the inclusion in the contractable category of that portion of gas in a pool which is placed under firm contract by a company removing gas from the Province and where initial delivery is firm within three or possibly four years even though the gas may be normally considered as deferred.

(4) Views of Alberta and Southern

Alberta and Southern supported the CPA request respecting the categorization of a portion of deferred gas reserves as contractable. Mr. McMorland, testifying on behalf of Alberta and Southern, stated that in certain cases quantities of now deferred reserves will be available to supply a portion of the contractable requirements and in fact in certain cases deferred reserves have already been placed under contract to supply such requirements. He concluded that these reserves should be considered as contractable for purposes of the surplus calculation.

(5) Views of Canadian Fina

Canadian Fina supported the CPA proposal respecting deferred gas reserves on the basis of its contention that reserves which have been deferred from immediate delivery for conservation reasons are proved reserves with a high degree of certainty. Canadian Fina stated that a substantial portion of these reserves, especially those from cycling projects, will become available in the next 10-year period. Accordingly, it felt such reserves should be considered as contractable. Mr. Pot, Canadian Fina's witness, stated that a deferred gas reserve that can reasonably be expected to become contractable during the first 10 years following the commencement of the 30-year protection period should be included in contractable reserves whether the reserves are specifically under contract or not.

(6) Views of Consolidated

Consolidated supported the CPA views regarding the inclusion of a portion of deferred gas reserves in the contractable surplus calculation. Mr. Lashuk, the witness for Consolidated, stated that his company believed that deferred gas reserves available within a 10-year period should be included in the contractable surplus calculation whether or not a contract for such gas has been made, and in fact, such deferred reserves should be treated the same as any non-deferred gas reserve. Mr. Lashuk argued that if such an approach should reduce the degree of protection for the people of Alberta, greater reliance could be placed on the conditions in permits issued by the Board which provide for the supply of gas to local utility companies by permittees.



(7) Views of Trans-Canada

Trans-Canada supported the proposed alteration respecting deferred gas reserves to the extent that such an alteration would include in the calculation of the contractable surplus only that portion of deferred reserves that had been approved by the Board for production and sale. Mr. Leslie, testifying on behalf of Trans-Canada suggested that if production has been approved from a deferred gas reserve and if such gas is under contract to a company removing gas from the Province, only that portion which is actually deliverable during the term of the permit should be included in the contractable surplus calculation. He stated further that if such a reserve were under contract to a local utility company all of it should be included in the contractable surplus calculation and the reserve should be considered as set aside for local use. Mr. Leslie stated that if a deferred reserve had been approved by the Board for production and sale but was not under contract it should be considered as contractable only if initial production would begin in three years or less.

(8) Views of Other Interveners

Great Plains, Home, Husky, Pacific, Amoco and Shell all supported the views of CPA respecting the inclusion of deferred gas reserves in the contractable surplus calculation. These interveners generally agreed that such an approach was desirable to avoid the possibility of "locking in" reserves in the Province by unnecessarily delaying initial production.

(9) Views of the Board

Upon review of the evidence respecting the matter of deferred reserves, the Board agrees with CPA and several of the interveners that some portion of the reserves currently classified as deferred can appropriately be included in the contractable surplus calculation. In considering this matter the Board has concerned itself with two separate questions. Firstly, the Board has attempted to define a proper basis for classifying any particular deferred reserve as at least partially contractable without having regard to whether or not the entire reserve should be so classified. Secondly, the Board has concerned itself with the question of whether the classification of a reserve as contractable should mean that all or only a portion of the reserve is contractable.

Circumstances under which a Deferred Reserve would be Considered Contractable. With respect to the first question, the Board does not agree with the CPA view that each deferred gas reserve from which initial production will take place within 10 years should be considered as contractable. The Board agrees with the Utility Companies, the Cities and Trans-Canada that such an approach could lead to a situation where deferred reserves available some five to ten years in the future result in the calculation of an apparent contractable surplus even though reserves actually contractable for initial delivery within two or three years do not exist. The Board notes that the aforementioned interveners agreed that a deferred reserve from which initial production is certain to begin within three years

could reasonably be included in contractable reserves. The Board agrees that such a reserve is little different than the typical non-deferred reserve in that it is available to be placed under contract either for Alberta consumers or for removal from the Province. Accordingly, the Board believes such a reserve should be included at least in part in the contractable surplus calculation.

Most of the participants at the hearing agreed that a deferred reserve, under contract to a company removing gas from the Province and included in an application for a permit could be considered as contractable for purposes of assessing the application if initial production could be expected within a reasonable time period. The Board is of the opinion that the additional qualifications that a reserve must be under contract and be included in an application for its removal would eliminate the earlier mentioned possibility of calculating an apparent but non-existing contractable surplus. For this reason, the Board is prepared to recognize at least a portion of such a reserve as contractable if its time of initial production can be anticipated with a reasonable degree of certainty. The Board is not prepared to classify as contractable any gas reserve from which initial production is deferred so far into the future that a reasonable production prediction is not possible. This would normally mean that reserves from which production would be totally deferred for longer than about 10 years would not be considered as contractable, even in part.



In summary, the Board believes it would be proper to treat as contractable reserves,

- (a) a deferred reserve from which initial production is certain to begin within three years, or
- (b) a deferred reserve, under contract and included in a permit or an application for permit if initial production could be expected within a reasonable period.

The Portion of a Deferred Reserve to be Considered

Contractable. With respect to the amount of a reserve which

should be recognized as contractable, the Board does not agree with the view put forward by CPA and supported by several interveners, particularly Consolidated, that an entire deferred reserve should be classified as contractable even though only limited deliveries are approved or anticipated or though contracts have been made applicable to only a portion of the reserve. The Board believes that this approach could, as pointed out earlier in the discussion, lead to a calculated apparent contractable surplus even though contractable reserves do not exist. For this reason the Board believes that it should recognize as contractable only that portion of deferred reserves which the Board conservatively estimates will be produced during the period being considered.

In the case where a reserve is not under contract but has qualified as contractable because limited production will take place within three years, the Board is prepared to include as contractable, only the portion of the reserve that would be produced if the approved producing rate continued until the end

of the 30-year protection period.

Where a deferred reserve has been classified as contractable because it is under contract and also included in an application for permit, the Board is prepared to consider as contractable only that portion of the total reserve which is covered by the contracts and which in the Board's opinion can reasonably be expected to be delivered during the term of the permit in which the reserve would be included. The portion of the reserve reasonably deliverable during the term of the permit would be determined by projecting any existing or approved producing rate at a constant level until the time when in the Board's opinion, full or normal deliveries could reasonably be expected. Thereafter the production would be projected until the terminal year of the permit, at a rate appropriate for the reservoir, normally some 1 million cubic feet per day for each 8.4 billion cubic feet of marketable gas initially in place. Prior to including the reserves so determined in a permit, the Board would have to be generally satisfied that the subject reserves combined with all other reserves in the permit or application are capable of meeting the delivery requirements of the proposed permit. The Board would have particular concern for this matter during the period of low or no production from the partially deferred reserve.

Where a deferred reserve is placed under contract, in whole or part, to an Alberta consumer, the Board would consider this a special situation and would classify part or all of

the reserve as contractable or otherwise on the basis of a detailed assessment of the particular situation.

In summary, the Board is prepared to consider as the contractable portion of a deferred reserve that part of the reserve which could reasonably be produced during the period in question. It believes the reasonably producible portion of the reserves should be determined on the following basis:

- (1) Where the reserve is initially producible within three years but not under contract, the volume that would be produced at the approved producing rate projected to the end of the 30-year period.
- (2) Where the reserve is under contract and also included in an application for permit, the volume that would be produced at the approved producing rate projected to the time at which full deliveries could reasonably be expected and thereafter the full delivery rate until the terminal year of the permit.
- (3) Where the reserve is under contract in whole or part to an Alberta consumer, on the basis of a detailed study of the situation.



V AN ANNUAL GAS RESERVES HEARING

(1) Submission of Board Staff

In the notice of hearing concerning the application from the CPA, the Board undertook to hear submissions concerning, among other things, the holding of an annual reserves hearing to consider the gas reserves of the Province and the use of these reserves to assess applications made during the subsequent year.

Subsequent to the publication of the notice of hearing the Board staff issued a memorandum elaborating on the additional matters raised in the notice of hearing. With respect to the holding of annual reserves hearings the Board staff suggested in the memorandum that the reserves of the Province could be adjusted to the time of consideration of applications under The Gas Resources Preservation Act, 1956, by inclusion of the reserves growth that could reasonably be expected during the interim period under question. Two methods of making simple adjustments were suggested as follows:

"Method 1 - Calculate the adjusted reserves by proportionate adjustments to estimated annual production and an assumed reserves growth rate. In symbols, if:

D = established reserves set following annual hearing, (Tcf)  
P = estimated annual production, (Tcf)  
G = assumed growth rate, (Tcf per year)  
x = the time between the annual reserve determination and the date of the reconsideration, (months)  
 $D_x$  = the adjusted reserves x months after the reserve assessment date

then under this method

$$D_x = D - \left( \frac{x}{12} \right) P + \left( \frac{x}{12} \right) G$$

Method 2 - Consider major changes in reserves for individual pools at application hearings where the aggregate of such changes would exceed the relevant portion of the assumed reserve growth rate determined by Method 1, that is:  $\left( \frac{x}{12} \right) G$ .

Major changes might be defined as those greater than 200 billion cubic feet or some other suitable number. A calculation similar to that applied in Method 1 would be used to adjust the reserves to some subsequent application date.

If in addition to the symbols referred to above in Method 1, the following definitions are adopted:

$D_A$  = change in reserve for pool A, (Tcf)

$D_B$  = change in reserve for pool B, (Tcf)

under this method the adjusted reserves would be

$$D_x = D + D_A + D_B - \left( \frac{x}{12} \right) P$$

assuming  $D_A + D_B > \left( \frac{x}{12} \right) G$  "

## (2) Present Policy

The Board's responsibilities under The Gas Resources Preservation Act, 1956, require that it estimate the established reserves of gas in the Province and project the trends in the growth of reserves of gas, as discussed in Section I.

The Board, pursuant to the Oil and Gas Conservation Regulations, receives basic well and pool data as such data are obtained. It also receives other interpretative data in connection with applications made to it under The Oil and Gas Conservation Act, 1969, and The Gas Resources Preservation Act, 1956. The Board estimates the reserves of fields, pools, and areas from these data, published data and its own knowledge.

The gas reserves of a pool are considered at public hearings

when basic reserve data for the pool are included in the submission respecting an application. As a result the pools considered at hearings are generally those not previously included in a permit issued under The Gas Resources Preservation Act, 1956, and pools where an operator is seeking reserve adjustments based on performance, additional development or other new information. Pools supplying Alberta requirements are seldom dealt with at hearings and hence generally the estimation of reserves of such pools have not received public scrutiny.

The Board reviews the reserves of pools it has previously estimated when new reservoir information or considerable performance data become available. It also reviews submission to the Board respecting applications under section 38 of The Oil and Gas Conservation Act, 1969, such as those respecting gas processing, gas cycling and enhanced oil recovery schemes. Where it appears that adjustments to the Board's estimates are warranted, the Board makes such adjustments on the basis of the evidence it has at hand generally without discussion with industry representatives.

(3) Views of CPA

CPA does not favour an annual hearing to consider the gas reserves of the Province. It submitted that the holding of an annual gas reserves hearing would only result in one additional hearing without any commensurate savings in the total time spent at gas hearings.



CPA believes that confidential information, applicable to gas reserve determination, would not likely be made public prior to a gas removal permit hearing and that the Board would be disappointed with the small number of submissions presented at an annual reserves hearing. It stated that the Board could make reserve adjustments without a hearing, and where it felt discussions of the reductions it proposed are appropriate, the Board staff could hold such discussions informally with the operators of wells in the pools affected. The adjustments would have regard only to information which is not confidential. Mr. McDonald testified on behalf of CPA that he believed it was not necessary for the Board to hear and consider the views of other interested persons before making such adjustments. He further believed that if other interested persons objected to the adjustments, which would be shown in the Board's annual reserve report, they could make a submission on the reserves of the pool at the hearing of the next permit application.

(4) Views of the Utility Companies

The Utility Companies favoured the holding of a reserves hearing if this would reduce the amount of time spent in consideration of reserves of pools at hearings and stated they thought there was a possibility such annual reserves hearings would be beneficial from this point of view.

(5) Views of the Cities

The Cities favoured the holding of periodic gas reserves hearings but did not take a strong position on the proposal.

They noted that of the 4.8 trillion cubic feet of increase in reserves that occurred in 1968, 4.2 trillion cubic feet was due to re-assessment and development drilling in previously reviewed pools. They concluded from this that it was likely that most of the information involved in considering reserve changes was not of a confidential nature and could be presented at periodic reserves hearings.

(6) Views of Husky

Husky submitted that an annual hearing to determine Provincial ultimate and developed reserves was clearly necessary. It expressed the belief that if such hearings were held the reserves should be adjusted to the date of consideration of an application for removal of additional gas from the Province by either of the methods suggested for consideration by the Board staff. Husky proposed that the choice of method to be used in adjusting reserves to the time of consideration of an application should be left to the applicant.

(7) Views of Amoco

Amoco supported the holding of an annual reserves hearing and proposed that the provincial gas reserves be adjusted to the date of assessment of an application by considering the major changes in the reserves of pools and making the balance of the adjustment by formula as proposed under Board staff Method 2.

(8) Views of Alberta and Southern

Mr. McMorland, the Alberta and Southern witness, did not

favour an annual reserves hearing. He was of the opinion that informal meetings of the Board staff with the operators of the pools affected would provide sufficient consultation prior to the Board making changes in the reserves of pools. Mr. McMorland stated he believed his company would want to be represented at such meetings but that his company's attendance should not be required to formalize the proceedings. Mr. McMorland stated he did not believe an application should be considered deficient if it omitted data for pools where the reserves had not been considered at a hearing for several years.

(9) Views of Consolidated

Consolidated favoured continuation of the Board's present method of gas reserves surveillance. It, like CPA, submitted that where data could be kept confidential the producers would be reluctant to release the data until their reserves were contracted. As a result there would be less data available at an annual reserves hearing than at a hearing to consider an application for a permit to remove gas from the Province. It also submitted that the saving in effort through holding annual reserves hearings would not be especially great since the Board and any applicant would likely make an estimate of reserves in active areas, at the time of an application, to ascertain whether the long term growth is representative for the interval since the last reserves hearing.

(10) Views of Home

Home favoured continuation of the present method of



determining the gas reserves of the Province. It submitted that the present method was the most practical and flexible and that there was little value in holding an additional hearing.

(11) Views of Pacific

Pacific submitted that the present method of establishing the gas reserves of the Province provided adequate flexibility for interested persons to be heard and to resolve differences in gas reserve estimates for individual pools. It believes the holding of an annual reserves hearing is unnecessary.

(12) Views of Shell

Shell did not favour the holding of an annual reserves hearing. It submitted that the present practice of evaluating reserves at specific gas hearings has been adequate to establish the gas reserves of the Province. In its view this procedure which provides for detailed re-examination of established reserves by the parties concerned with exploiting portions of these reserves, at a hearing initiated by the interested contracting parties, results in adequate and timely reserve revisions. Further the expense of such hearings is properly borne by the interested parties. It doubted that annual reserves hearings would provide sufficiently improved data to justify the added expense.

(13) Views of Trans-Canada

Trans-Canada did not support the holding of an annual hearing to consider the gas reserves of the Province. It submitted that the present method of assessing the gas reserves at the time of each hearing of an application for permission to

remove gas from the Province is the most practical and realistic method because the actual reserve situation at the time of each such application is considered. Trans-Canada submitted that the holding of an annual reserves hearing and the adjustment of reserves to the assessment date of an application largely by formula would be unsatisfactory. It stated such a procedure would make the purchase of gas in small fields more difficult and reserves in such small fields and additions to small reserves might not be recognized in the determination of the up-dated Provincial surplus. Trans-Canada added that the use of the formula approach to adjust reserves to the application assessment date of its June 1968 application would have resulted in the provincial gas reserves being 0.8 trillion cubic feet less than was determined under the present procedure.

(14) Views of the Board

The Board does not wish to introduce more complex and costly administrative procedures unless it is satisfied that they represent an improvement and are desirable for the efficient discharge of its responsibilities..

The Board notes that four of the interveners favoured annual reserves hearings and six opposed the holding of such hearings. Further, some of those that favoured annual reserves hearings took a neutral position after hearing the objections of those opposed to such hearings. There were no objections to the present procedure in which the Board sets the reserves of pools on the basis of its own knowledge and such additional evidence as is submitted for particular pools dealt with at hearings.

The operators and gas purchasers appear to be generally satisfied with the continuation of these procedures as long as the Board staff arrange additional liaison with interested parties in a field, pool or area, where the Board feels this appropriate, at informal meetings.

The Board agrees with CPA and Consolidated that operators may be less inclined to release data for a reserves hearing than for an application hearing at which reserves of the gas the operators have agreed to sell would be considered. However, it agrees with the Cities that the proportion of data on hand withheld on this basis would likely be small.

The Board recognizes that adjusting reserves to the assessment date of an application, as would be necessary if annual reserve hearings were the principal basis for establishing the reserves of the Province, could result in a particular year in over crediting or under crediting the Provincial reserves. It nevertheless believes that if reserve growth trends are interpreted on a reasonable basis these effects would balance overall, rather than generally result in a lag in recognizing reserve appreciation as suggested by Trans-Canada. The Board also disagrees with Trans-Canada's view that adopting procedures for adjusting reserves such as those presented for discussion purposes in the elaboration of policy matters (d), (e) and (f) of the notice of hearing would discriminate against new fields, pools, and areas with small reserves and additions to reserves of small fields. Such reserves where an applicant has contracted to purchase additional gas could be considered at the application



hearing if appropriate evidence were submitted.

The Board disagrees with Shell's view that reviewing reserves at application hearings as they are brought up by applicants provides for a satisfactory re-examination of established reserves. In its view there are incentives for the applicant to raise for consideration only those reserves where increases facilitating the granting of the application are indicated. However, the Board believes that regular reviews of reserves by the Board staff without the holding of a reserves hearing would bring to its attention any reserves which have been over estimated previously.

The Board believes that if industry wished to participate extensively in the review of the reserves of the Province, the reserves of the Province as a whole could be assessed somewhat more effectively and efficiently both by industry and the Board at regular annual reserves hearings rather than at hearings of applications by several of the many permit holders. However, the holding of annual reserves hearings would not eliminate the need to consider at applications hearings the reserves an applicant proposed to remove from the Province.

In summary the Board does not consider the majority of the objections raised by the applicant and interveners as serious disadvantages to holding a gas reserves hearing and sees considerable merit in the possibility. However, it recognizes that holding a special gas reserves hearing would be expensive to industry and the Board and it, like the majority of those who made representations at the hearing, does not consider a

hearing necessary for the time being. Accordingly, the Board believes that the present procedure of establishing the gas reserves of the Province should be continued with some additional consultation on individual reserve estimates between the Board staff and industry. Where interested persons wish the Board to reconsider its interpretation of the reserves of a pool they could make a submission respecting the reserves of the pool at the next hearing of an application under The Gas Resources Preservation Act, 1956 for permission to remove additional gas from the Province.

VI PERIODIC REQUIREMENTS HEARING AND  
INTERIM ADJUSTMENTS

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(1) Submission of Board staff

Matter (e) in the notice of hearing referred to the possibility of the holding of periodic requirements hearings and interim adjustments between such hearings. In the Board staff document, it was envisaged that the requirements hearing would consider detailed submissions on Alberta's long term requirements, and would be distinct from any one hearing concerning removal of gas from the Province. Reference was made to the possibility of holding the requirements hearing once every five years, to correspond to the time interval between successive Federal Government population censuses.

Three methods of simplified interim adjustments between the setting of the long term requirements were suggested as a basis for discussion in the Board staff document. These were:

"Method 1 - Establish the growth rate in the latter portion of the forecast period of the long term forecast and extrapolate requirements on the basis of this rate. In symbols, if

$R_L$  = Province's long term requirements set after the hearing at time 0, to be reviewed at time t

$R_{L+2}$  = Province's long term requirements at time 2

$P_2$  = production, time 0 to time 2

$r_n$  = estimated requirements for last year of long term forecast

$g$  = annual growth rate over last portion of forecast period.

then  $R_{L+2} = R_L - P_2 + r_n \left[ (1 + g) + (1 + g)^2 \right]$

"Method 2 - Express interim adjustments in terms of the ratio of initial year requirements to instant year requirements. Thus under this method, if:

$r_1$  = initial year requirements in long term forecast

$r_2$  = requirements in year 2, then

$$R_{L+2} = \left( \frac{r_2}{r_1} \right) R_L.$$

"Method 3 - Compute the equivalent average annual growth rate to achieve the long term requirements set at time 0 ( $R_L$ ). Apply this growth rate to determine long term requirements at time 2. If:

$i$  = equivalent average annual growth rate

$n$  = term of forecast period,

then  $i$  results from the solution of the equation

$$r_1 (1 + i)^n = R_L$$

and under this method

$$R_{L+2} = r_2 (1 + i)^n."$$

Matter (f) in the notice of hearing referred to the simplification of interim adjustments of gas necessary to meet the Province's total requirements, including protection for peak requirements. Three methods were advanced in the Board staff document, and are outlined below:

"Method 1 - The gas required to protect for terminal peak day requirements ('cushion' gas) could be estimated as some fraction of the total deliveries required during the 30-year period. If:

$R_L$  = total long term requirements for delivery, (Tcf)

$C$  = cushion gas required for terminal year peak, (Tcf)

$T$  = total gas necessary to protect for Alberta's 30-year requirements, (Tcf)



then  $T = R_L + C$

and under the method, C would be given by:

$$C = xR_L,$$

where x is a fraction determined from history; x has ranged from a low of 0.34 to a high of 0.56 over the past 15 years and has been declining recently.

"Method 2 - The cushion gas required for the thirtieth-year peak could be estimated as some multiple of the first year requirements.

Using the same symbols as before, and defining first year requirements for delivery as  $r_1$  (Tcf) then this method implies

$$C = yr_1$$

where y is a factor determined from history; it has ranged from a low of 20 to a high of 31 over the past 15 years and has recently been declining.

"Method 3 - The total requirements of the Province could be estimated as a multiple of the first year requirements. Under this method

$$T = zr_1$$

where z is a factor determined from history; it has varied between 70 and 96 over the past 15 years and, similarly to 'x' and 'y', has been declining recently. The method would eliminate the need for interim adjustments to  $R_L$ , the long term gas requirements, since such adjustments would essentially be incorporated in the 'z' factor.

Under all methods, the fraction x, y and z would be subject to periodical review."

Since matters (e) and (f) concern the reserves necessary for the protection of the Province's total requirements, comprising requirements for delivery and peak demand, both matters are treated in this section. References by interested parties to various methods relate to those included in the Board staff document and listed above.

## (2) Views of CPA

CPA recommended that hearings to determine Alberta's gas

requirements be held at regular intervals. CPA expressed the belief that such regularly held hearings would attract a wider range of submissions, while interested parties would be able to devote additional study to individual forecasts. The relatively mature status of the gas economy in Alberta suggested to CPA that detailed forecasts of provincial gas requirements were not required at such frequent intervals as necessary, for example, for reserves. CPA suggested that an appropriate interval between hearings would be 3 to 5 years.

For the interim determination of requirements for delivery, CPA stated Method 1 outlined in the Board staff document represented the most accurate method of adjustment. If significant differences between the forecast trend of requirements and actual results became apparent, CPA recommended that the Board should consider suggestions from interested persons for revisions to the primary forecast. At the hearing, Dr. Mattinson, a CPA witness, interpreted a significant difference as meaning a persistent variation of actual requirements from forecast requirements on a year to year basis. This pattern would indicate the presence of a fundamental error in the original forecast.

With respect to the inclusion of interim adjustments for peak reserve requirements, CPA agreed that simplification of these calculations was desirable and expressed the opinion that Method 3 outlined in the Board staff document would be adequate.

### (3) Views of the Cities

The Cities supported the holding of regular requirements

hearings and suggested that a period of three years between hearings would be appropriate. In testimony, Dr. Flock indicated that the calling of a requirements hearing in the late spring would be suitable.

The Cities believed Method 1 should be used to make interim adjustments to requirements for delivery and Method 1 for adjustments to peak reserve requirements.

(4) Views of the Utility Companies

The Utility Companies favoured the holding of a hearing at regular intervals and suggested that once every three years would be appropriate. Mr. Maybin stated that the setting of regular hearings would enable the Utility Companies to prepare a more rigorous forecast and suggested that March would be a suitable time. The Utility Companies also suggested that Method 1 would be suitable for making interim delivery adjustments between hearings and preferred Method 1 for cushion gas requirements.

(5) Views of Trans-Canada

Trans-Canada expressed the belief that a requirements hearing at regular intervals was reasonable and that Method 1 should be used for interim adjustments. It submitted that the adjustment for cushion gas should not be a multiple of the first year requirements, but should be determined in a manner similar to Method 1.

(6) Views of Alberta and Southern

Alberta and Southern said it did not believe it necessary to formalize the scheduling of hearings and interim computations.

(7) Views of Home

Home saw considerable merit in the holding of periodic hearings to determine the Province's future gas requirements and recommended that such hearings should be held every three or four years. Home favoured the computation of interim requirements for delivery by Method 1. It believed Alberta's total requirements including cushion gas requirements could be usefully expressed in a simplified formula, and supported Method 3.

(8) Views of Husky

Husky favoured the determination of provincial requirements at a hearing once every two years and suggested that interim adjustments should utilize Method 3. With respect to cushion gas adjustments, Husky supported Method 1, since it was related to total rather than initial year requirements and would ensure separate identification of cushion gas and long term gas requirements.

(9) Views of Pacific

Pacific stated the Board's current methods of assessing long term gas requirements were satisfactory; it considered the holding of a periodic hearing was unnecessary.

With respect to interim adjustments for deliverable requirements, Pacific recommended the use of Method 3. It said this method would properly reflect growth rates derived from accepted statistical growth formulae. Pacific recommended that the simplification of interim calculations of cushion gas would best be achieved by Method 1, since it was a simplified form of



the Board's derived formula.

(10) Views of Shell

Shell favoured the holding of hearings at five-year intervals for consideration of Alberta's gas requirements. Shell stated that regular hearings would result in more accurate forecasts, since more submissions would be drawn from interested parties, which might lead to the development of improved techniques for the determination of requirements. Shell also proposed that if significant departures from assumptions underlying forecasts adopted after the regular hearing became apparent, the forecast should be reviewed.

For interim delivery requirement adjustments, Shell supported Method 1. It recommended that the interim cushion gas requirements be established by multiplying the 30th year delivery requirement determined at the interim hearing by the ratio of cushion gas to the 30th year requirement for delivery determined at the periodic requirement hearing.

(11) Views of Amoco

Amoco agreed with the holding of a hearing as required from time to time to consider provincial gas requirements. No comment was offered with respect to interim adjustments between hearings.

(12) Views of Consolidated

Consolidated found merit in the suggestion that the interim reserves needed to meet cushion gas requirements of Alberta be determined as a multiple of the total 30-year requirements (Method 1). Consolidated stated sufficient history existed for

reliance upon such a multiple and suggested that a factor of 1.34 be used for the next few years. The factor should be subject to periodic review, based on a detailed reserves deliverability study.

Consolidated did not offer evidence concerning periodic requirements hearings and interim adjustments for deliverable requirements.

(13) Views of the Board

Regular Requirements Hearings. The Board observes a clear consensus for holding requirements hearings on a regular basis, distinct from any one hearing concerning removal of gas from the Province. The Board agrees with the Cities, Utility Companies and the producing industry and therefore intends to adopt this procedure. With respect to frequency of hearings, the Board notes that the majority favoured some three years. The Board concurs with this view but believes that it might be feasible to extend the period when more experience with the procedure is acquired. The Utility Companies and the Cities indicated that the hearings could be timed for early spring. The Board can see no objection to this suggestion and, therefore, is prepared to call the first Alberta long term requirements hearing for mid-April 1970. The scope of the hearing would embrace both the Province's 30-year requirements and the 30th year peak day requirements.

Interim Adjustments of Requirements for Delivery. The majority of industry favoured the utilization of Method 1 outlined

in the Board staff document. Given the availability of the long term requirements forecast as set at the regular hearings to be called by the Board, the Board agrees that Method 1 is more direct and accurate than the use of ratios based on initial year requirements and the use of equivalent growth rates as suggested in Methods 2 and 3 respectively. Moreover, Method 1 automatically generates the 30th year delivery requirements, which have utility in peak day calculations. Thus, the Board will calculate interim adjustments according to the following formula, applied for example to time 2 following the setting of the long term requirements on the basis of the periodic hearing:

$$R_{L+2} = R_L - P_2 + r_{30} \left[ (1 + g) + (1 + g)^2 \right]$$

where

$R_L$  = Province's long term requirements set after the hearing at time 0, to be reviewed at time 3;

$R_{L+2}$  = Province's long term requirements at the beginning of time 2;

$P_2$  = production, time 0 to end of time 1;

$r_{30}$  = estimated requirements for last year of long term forecast;

$g$  = annual growth rate over last portion of forecast period.

In the event that significant deficiencies in the long term gas forecast become apparent between the regular requirements hearings, or if major unanticipated developments be realized, the Board would consider incorporating fundamental revisions in interim adjustments. Under these circumstances, the Board would hear evidence at any hearing for the removal of gas from the

Province and might call an interim requirements hearing.

Interim adjustments to 'cushion' gas requirements. Having regard for the different nature of peak day requirements and deliverable requirements, the Board believes that there is merit in retaining a separate identification of each category in making interim adjustments. Thus, the Board does not endorse Method 3 in the Board staff document. Methods 1 and 2 both express cushion gas requirements as ratios based on long term delivery requirements and first year requirements respectively. The Board notes that given the recent declining trend in the respective factors, interim adjustments probably should provide for extrapolation of such trends. The Board believes an easier method would be that suggested by Shell. The latter entails increasing the cushion gas requirement adopted by the Board following the periodic requirements hearing by the proportionate increase in the 30th year requirement. The 30th year requirement would be calculated by the interim adjustment method endorsed above. Thus, the Board will adopt the following formula for interim cushion gas requirements, effective following the requirements hearing to be called by the Board in the spring of 1970:

$$C_{30+n} = \frac{r_{30+n}}{r_{30}} \times C_{30}$$

where  $C_{30}$  = cushion gas requirement determined at the regular three year hearing;

$C_{30+n}$  = cushion gas determined at an interim year n years after the regular hearing;



$r_{30}$  = 30th year requirement for delivery  
determined at the regular hearing;

$r_{30+n}$  = 30th year requirement for delivery  
determined at an interim year  $n$  years after  
the previous regular hearing.

## VII     DECISION

The following is a summary of the Board's decision respecting each of the matters considered at the subject hearing.

1.     The Board accepts the suggestion of CPA respecting the average annual growth rate for gas reserves to be used in determining the future surplus, to the extent that it will project future growth on the basis of the growth experienced over the most recent 10-year period. In projecting the growth rate into the future, the Board will have regard to the trend in the growth rate over the 10-year period, the percentage of the ultimate reserves which has been developed, and other relevant factors.

2.     The Board approves the recommendation of CPA that the number of years of growth of gas reserves used in the future surplus calculation be determined on the basis of the Province's estimated remaining reserve potential. The Board hereby adopts the following formula for calculating the number of years and will round the number to the nearest one-half year:

$$T_G = \frac{R_{POT} - R_{EST}}{10}$$

where  $T_G$  = Years of growth of gas reserves;

$R_{POT}$  = Potential initial marketable reserves of the Province, trillions of cubic feet;

$R_{EST}$  = Established initial marketable reserves at the time of the formula's application, trillions of cubic feet.

3. The Board agrees in part with the application of CPA respecting the inclusion of deferred gas reserves which will become available within 10 years in the calculation of the contractable surplus. The Board has altered its present policies respecting deferred reserves to the extent that it will include as contractable those deferred reserves from which initial production will take place within three years plus those deferred reserves from which initial production will occur beyond three years but within the foreseeable future if the reserve is under firm contract to a company removing gas from the Province and is also included in a permit or application for a permit for the removal of the gas. The portion of the reserve classified as contractable will be dependent upon the approved or projected producing rates from the reserve.

4. The Board will not conduct a regular gas reserves hearing, but will increase its informal liaison with industry respecting the estimating of gas reserves.

5. The Board will conduct a requirements hearing every three years beginning in the spring of 1970. The hearing will deal with both the Province's 30-year requirements and the 30th-year peak day requirements. Between hearings, and provided no substantial new evidence is available, the Board will make interim adjustments to the requirements on the basis of the following formula.

$$R_{L+2} = R_L - P_2 + r_{30} \left[ (1 + g) + (1 + g)^2 \right]$$

- where  $R_L$  = Province's long term requirements set after the hearing at time 0, to be reviewed at time 3, billions of cubic feet;
- $R_{L+2}$  = Province's long term requirements at beginning of time 2, billions of cubic feet;
- $P_2$  = production, time 0 to end of time 1, billions of cubic feet;
- $r_{30}$  = estimated requirements for last year of long term forecast, billions of cubic feet;
- $g$  = annual growth rate over last portion of forecast period, per cent.

6. Effective following the 1970 requirements hearing, the Board will during the interim between requirements hearings, determine the Province's cushion gas requirement using the following formula:

$$C_{30+n} = \frac{r_{30+n}}{r_{30}} \times C_{30}$$

- where  $C_{30}$  = cushion gas requirement determined at the regular three year hearing, trillions of cubic feet;
- $C_{30+n}$  = cushion gas determined at an interim year n years after the regular hearing, trillions of cubic feet;
- $r_{30}$  = 30th year requirement for delivery determined at the regular hearing, billions of cubic feet;
- $r_{30+n}$  = 30th year requirement for delivery determined at an interim year n years after the previous regular hearing, billions of cubic feet.

The first four of the above decisions will be put into effect immediately. The first requirements hearing will be held next spring, and after announcement of the Board's findings upon that hearing, the decision regarding the determination between hearings of the cushion gas requirement will be applicable.



VIII SUMMARY OF THE BOARD'S POLICY FOR THE  
ADMINISTRATION OF APPLICATIONS FOR  
PERMITS FOR REMOVAL OF GAS FROM THE  
PROVINCE

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The following is a summary of Board policy respecting applications made under The Gas Resources Preservation Act, 1956, for permits for the removal of gas from the Province. The summary deals not only with those matters considered at the subject hearing but also with the entire policy respecting such applications.

1. An applicant for a permit must have under contract approximately 80 per cent of the total volume of gas for which he applies for a permit for the removal of gas from the Province. Furthermore, permittees must have under contract some portion of the gas in each of the fields, pools or areas proposed to be included in a permit.
2. For purposes of the surplus calculation, the Board will determine the amounts of gas which it anticipates will be taken by Alberta consumers, a permittee or an applicant for a permit, in accordance with the following general rules for all pools other than those in which a portion of the reserves are considered as deferred:

(1) Where an Alberta consumer has the only contracts in a field, pool or area, the entire reserve will be treated as available for Alberta requirements.

(2) Where an Alberta consumer and one or more companies removing gas from the Province have under contract gas reserves

in a field, pool or area, only the actual reserves under contract to the Alberta consumer will be treated as available for Alberta requirements and the remainder will be assumed to be available for inclusion in permits.

(3) Where only one company removing gas from the Province has contracts in a field, pool or area, the Board may consider that the entire reserve will be available for inclusion in the company's permit depending on the amount of gas under contract and the size and location of the reserve. In other instances the Board may consider that only that reserve actually under contract will be available for inclusion in a permit.

(4) Where more than one company removing gas from the Province has contracts in a field, pool or area, the field, pool or area may be named in both of the permits and the Board, on the basis of the amounts of gas under contract and the size and location of the reserves, may determine the volume of reserves going to the companies to be either the total reserves apportioned to each company on the basis of the contracts or the reserves actually under contract.

3. For pools in which a portion of the reserves are considered as deferred, the Board will adhere to the following general rules in determining the amounts of gas available to Alberta consumers, to a permittee or to an applicant for a permit:

(1) Where an Alberta consumer has contracts in a field, pool or area, the Board will determine the reserves available to the Alberta consumer on the basis of a detailed study of the particular situation.

(2) The Board will not consider for inclusion in a permit, a quantity of gas reserves greater than that under firm contract to the permittee or applicant for a permit.

4. In the actual consideration of an application for a permit authorizing the removal of gas from the Province, the Board will assess both the contractable and the future surplus. The Board will approve for removal from the Province only such quantities of gas which it is satisfied are surplus to both the contractable and future requirements of the Province.

5. Upon an application for the removal of gas from the Province the volume of gas that may be specified in a permit for removal, if found to be surplus to the requirements of the Province, will be the lesser of

(a) the volume applied for, or

(b) the established reserves in the fields, pools and areas named in the permit or applied for and judged by the Board to be available to the applicant in accordance with the rules set out in paragraphs 2 and 3 above.

6. Gas reserves will be estimated by the Board on the basis of evidence submitted at hearings of applications made under both The Gas Resources Preservation Act, 1956, and The Oil and Gas Conservation Act, and reserve estimates made by the Board staff. Following the hearing of an application under The Gas Resources Preservation Act, 1956, the Board or its staff may consult with the applicant and interveners prior to making reserve estimates

for specific fields, pools or areas, but confidential data will not be considered at such meetings.

7. The Board will segregate both the reserve and requirement quantities into a contractable component and a remaining future component for purposes of calculating the surplus. The method of calculating the surplus is illustrated in detail in Table VIII-1. The left-hand side of the table shows an entry number for convenience in discussion. The volumes shown are for illustrative purposes only and do not represent the actual surplus situation at any point in time.

8. To make the surplus calculation meaningful, all reserves and requirements will be converted to the common heating value basis of 1000 British thermal units per cubic foot.

9. Contractable reserves now considered within economic reach, shown in the first entry in the table, will be those portions of the total established gas reserves which are large enough in size or in close enough proximity to existing pipe lines to make delivery to markets economically feasible.

10. Deferred reserves, shown as entry 2, are subtracted from those within economic reach to determine the total contractable reserves, entry 3. Deferred reserves will include all gas reserves from which initial production is deferred beyond three years unless the reserves are under firm contract to a company removing gas from the Province and are included in a permit or an application for a permit to remove gas.

11. In determining the portion of a particular deferred reserve



which will be classified as contractable, the Board will adhere to the following rules:

(1) Where a reserve is not under contract but has qualified as contractable because initial production will take place within three years, the contractable reserves will be the total production resulting if the approved producing rate is projected to the end of the 30-year protection period.

(2) Where a reserve has been classified as contractable because the reserve is under contract and is also included in an application for permit, the contractable portion will be those reserves deliverable during the term of the permit. The deliverable reserves will be determined as the total production if the existing producing rate is projected until the time when full or normal deliveries can be expected and the normal delivery rate is projected thereafter until the terminal year of the permit.

(3) Where a reserve is under contract, in whole or part, to an Alberta consumer, the portion of the reserve considered as contractable will be determined on the basis of a detailed study of the particular situation.

12. The contractable Alberta requirements, shown in entry 4, will be taken as the greater of 30 times the requirements for delivery in the first year of the period under consideration or the remaining reserves in those fields committed to and supplying Alberta's requirements.

13. The permit requirements will include the remaining commitments for delivery, entry 5, and will also include provision to meet the terminal year peak day requirement for certain permits, entry 6. The latter provision will be only for older permits where calculations published by the Board have included some quantity of gas to provide for the terminal year peak day and where the permittee has not subsequently agreed to the discontinuance of this provision.

14. For permits including reserves reprocessed at pipe line straddle plants, the permit requirements will not include the gas utilized as fuel or removed as natural gas liquids at the reprocessing plants because such gas is included in the Alberta requirements.

15. The total contractable requirements, entry 7, will be the sum of the contractable Alberta requirements and the permit requirements. This will be subtracted from entry 3, the total contractable reserves, to give the contractable surplus shown as entry 8.

16. Entry 9 of the table shows the total Alberta requirements for delivery. These will be the 30-year requirements of the Province as set by the Board following requirements hearings to be held every three years. During the interim between hearings the 30-year requirements normally will be calculated on the basis of the following formula:

$$R_{L+2} = R_L - P_2 + r_{30} \left[ (1 + g) + (1 + g)^2 \right]$$

- where
- $R_L$  = Province's long term requirements set after the hearing at time 0, to be reviewed at time 3, billions of cubic feet;
  - $R_{L+2}$  = Province's long term requirements at beginning of time 2, billions of cubic feet;
  - $P_2$  = production, time 0 to end of time 1, billions of cubic feet;
  - $r_{30}$  = estimated requirements for last year of long term forecast, billions of cubic feet;
  - $g$  = annual growth rate over last portion of forecast period, per cent.

17. In determining the 30-year requirements of the Province for gas, the gas utilized as fuel and removed as natural gas liquids in processing plants located at the field level, is not included as a requirement. This is because such gas is considered as part of the surface loss and the reserves as estimated by the Board are adjusted to reflect these uses. On the other hand, the surface loss adjustment to reserves does not reflect the gas utilized as fuel and removed as natural gas liquids at pipe line straddle reprocessing plants nor does it include the fuel requirements of Alberta Gas Trunk Line. For this reason, the Board includes these uses in the estimated requirements of the Province.

18. Entry 10, the deliveries available from contractable reserves are that portion of the contractable Alberta requirements shown as entry 4 which can actually be delivered during the 30-year period. These deliveries will reflect the steadily increasing size of the market being served and also the delivery capabilities of the reserves. They will be determined on the basis of detailed deliverability schedules prepared following the regular requirements

hearings.

19. The total Alberta requirements for the 30th-year peak day are shown as entry 12 and are the cushion gas required to meet Alberta's peak day requirements. They will be calculated from the detailed deliverability schedules mentioned in item 18. During the interim between hearings the cushion gas requirement will be adjusted utilizing the following formula:

$$C_{30+n} = \frac{r_{30+n}}{r_{30}} \times C_{30}$$

where  $C_{30}$  = cushion gas requirement determined at the regular three year hearing, trillions of cubic feet;

$C_{30+n}$  = cushion gas determined at an interim year n years after the regular hearing, trillions of cubic feet;

$r_{30}$  = 30th-year requirement for delivery determined at the regular hearing, billions of cubic feet;

$r_{30+n}$  = 30th-year requirement for delivery determined at an interim year n years after the previous regular hearing, billions of cubic feet.

20. The cushion gas available from contractable reserves is shown as entry 13 and is the portion of contractable reserves not deliverable during the 30-year period. It is calculated as the difference between the contractable Alberta requirements, entry 4, and the deliveries from contractable reserves, entry 10. It is in turn subtracted from the total required cushion gas, entry 12, to determine entry 14, the reserves required from other sources to meet the 30th-year peak day. Entries 11 and 14, the requirements from other sources for delivery and as cushion gas, are added to give the total remaining requirements shown as entry 15.



21. Entry 16 of the table is the portion of deferred gas not included as contractable reserves but estimated by the Board on the basis of the best information available to be deliverable during the 30-year period or available to support the 30th-year peak day requirement.
22. The gas estimated to be deliverable within 30 years or available to support the 30th-year peak day requirement from reserves now considered beyond economic reach is shown as entry 17. Under current conditions it is taken as 75 per cent of the total reserves now considered beyond economic reach.
23. Entry 18 is the portion of the cushion gas provided for the terminal year peak day requirements of permits which the Board estimates as available for delivery or for meeting peak day requirements after the final year of the permits but within the 30-year period. This quantity will be determined from detailed deliverability schedules.
24. The future reserves available from gas not yet established as shown in entry 19 will be determined by projecting a growth rate based on the growth experienced over the most recent 10-year period, into the future a number of years calculated by the following formula:

$$T_G = \frac{R_{POT} - R_{EST}}{10}$$

where  $T_G$  = Years of growth of gas reserves;

$R_{POT}$  = Potential initial marketable reserves of the Province, trillions of cubic feet;

$R_{EST}$  = Established initial marketable reserves  
at the time of for formula's application,  
trillions of cubic feet.

25. The sum of entries 16, 17, 18 and 19 is the total remaining and future reserves shown in entry 20. Entry 15, the total remaining requirements is subtracted from entry 20 to determine the future surplus shown as entry 21.

OIL AND GAS CONSERVATION BOARD

G. W. Govier, P.Eng.,  
Chairman

A. F. Manyluk, P.Eng.,  
Deputy Chairman

Vernon Millard,  
Board Member

Dated at Calgary, Alberta

this 9th day of October, 1969.

TABLE V111

GAS SURPLUS TO ALBERTA'S REQUIREMENTS AND PERMIT  
COMMITMENTS AS ESTIMATED BY THE BOARD

ILLUSTRATIVE  
(ALL VOLUMES IN TRILLIONS OF CUBIC FEET AT 1000 BTU CUBIC FOOT)

<u>ENTRY NUMBER</u>	<u>CONTRACTABLE RESERVES</u>		
1	NOW CONSIDERED WITHIN ECONOMIC REACH	42.0	
2	LESS: DEFERRED	6.0	
3	TOTAL CONTRACTABLE RESERVES		36.0
	<u>CONTRACTABLE REQUIREMENTS</u>		
4	CONTRACTABLE ALBERTA REQUIREMENTS	8.0	
	PERMIT REQUIREMENTS:		
5	TO MEET COMMITMENTS	25.0	
6	TO MEET TERMINAL YEAR PEAK DAY	2.0	
7	TOTAL CONTRACTABLE REQUIREMENTS		35.0
8	CONTRACTABLE SURPLUS		1.0
	<u>REMAINING REQUIREMENTS</u>		
9	TOTAL ALBERTA REQUIREMENTS FOR DELIVERY	15.0	
10	LESS: DELIVERIES FROM CONTRACTABLE RESERVES	6.0	
11	DELIVERIES REQUIRED FROM OTHER SOURCES	9.0	
12	TOTAL ALBERTA REQUIREMENTS FOR THIRTIETH YEAR PEAK DAY	5.0	
13	LESS: AVAILABLE FROM CONTRACTABLE RESERVES	2.0	
14	REQUIRED FROM OTHER SOURCES TO MEET THIRTIETH YEAR PEAK DAY	3.0	
15	TOTAL REMAINING REQUIREMENTS		12.0
	<u>REMAINING AND FUTURE RESERVES</u>		
16	FROM DEFERRED GAS AVAILABLE WITHIN 30 YEARS	5.0	
17	FROM RESERVES NOW CONSIDERED BEYOND ECONOMIC REACH	2.0	
18	FROM RESERVES PROVIDING FOR TERMINAL YEAR PEAK DAY IN PERMITS	0.1	
19	FROM GAS NOT YET ESTABLISHED	12.0	
20	TOTAL REMAINING AND FUTURE RESERVES		19.1
21	FUTURE SURPLUS		7.1







